

Summary Run F15A

Johannes Staguhn, Dec. 10, 2001

F15 A was the first run with punched out **MoAu** devices which were read out with SQUID muxes. The devices have thick gold bars and have no absorbers. The main goal of the run was to determine noise performance, thermal conductivity and the time constant of these devices. The devices have a low normal resistance of $\sim 70 \text{ m}\Omega$ and the current read by the SQUIDs is $\sim 6 \text{ m}\Omega$ when superconducting, which indicates a high value for the stray resistance. The measured transition temperature is 442 mK (see also section *Thermal conductivity* below).

The **MoCu** NIST- array from CSO run#1 array was also available in the Alvin package for testing.

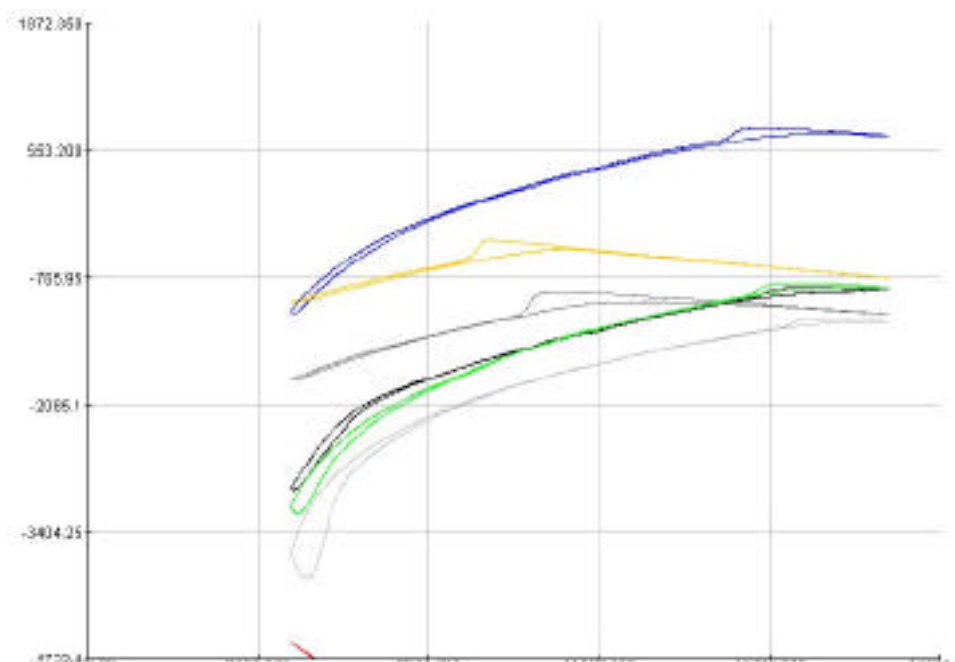
I-V curves

MoAu devices:

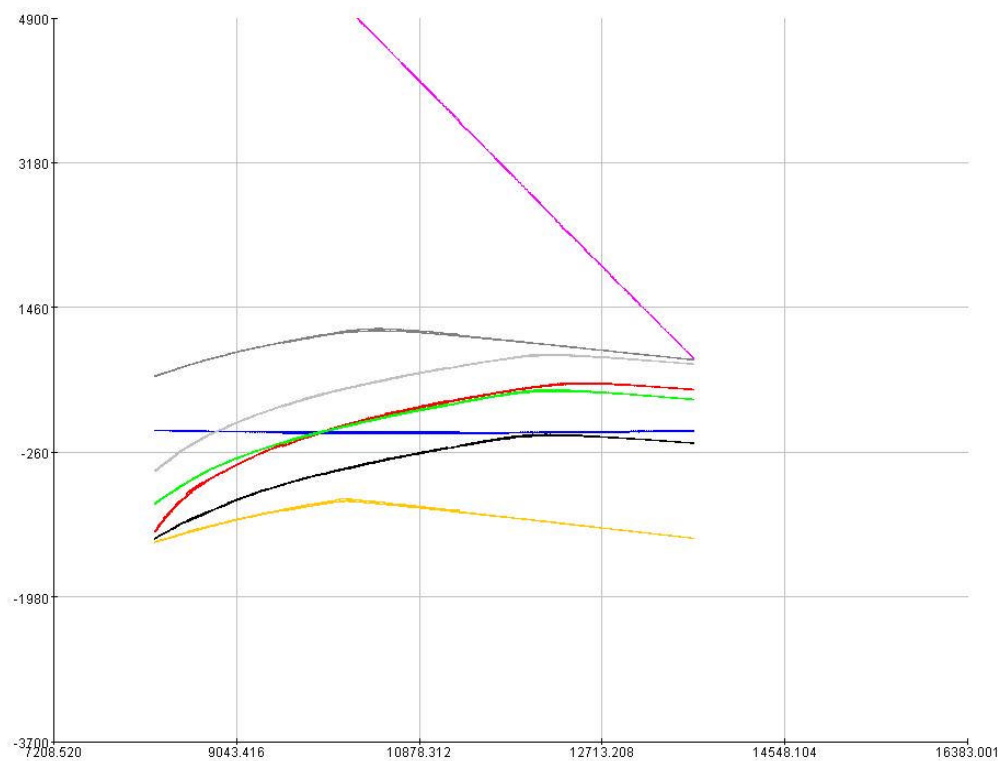
The IV-curves show important properties of the 6 working pixels.

The Joule power dissipated in the working device necessary to keep it on the transition is only about 0.2 pW which corresponds to a very low G_0 (see section *Thermal conductivity* below). The range of currents over which the devices can be biased on the transition is only about $2 \mu\text{A}$ ($0.5 I_0$). This is too low for the current optical configuration of FIBRE since it will saturate without additional optical filters.

The following figures which display I-V curves for scanning times of 50 seconds and 500 seconds, respectively, show a strong hysteresis.



I-V curve MoAu devices, 50 seconds scan time (note current on y-axis goes up for lower counts)

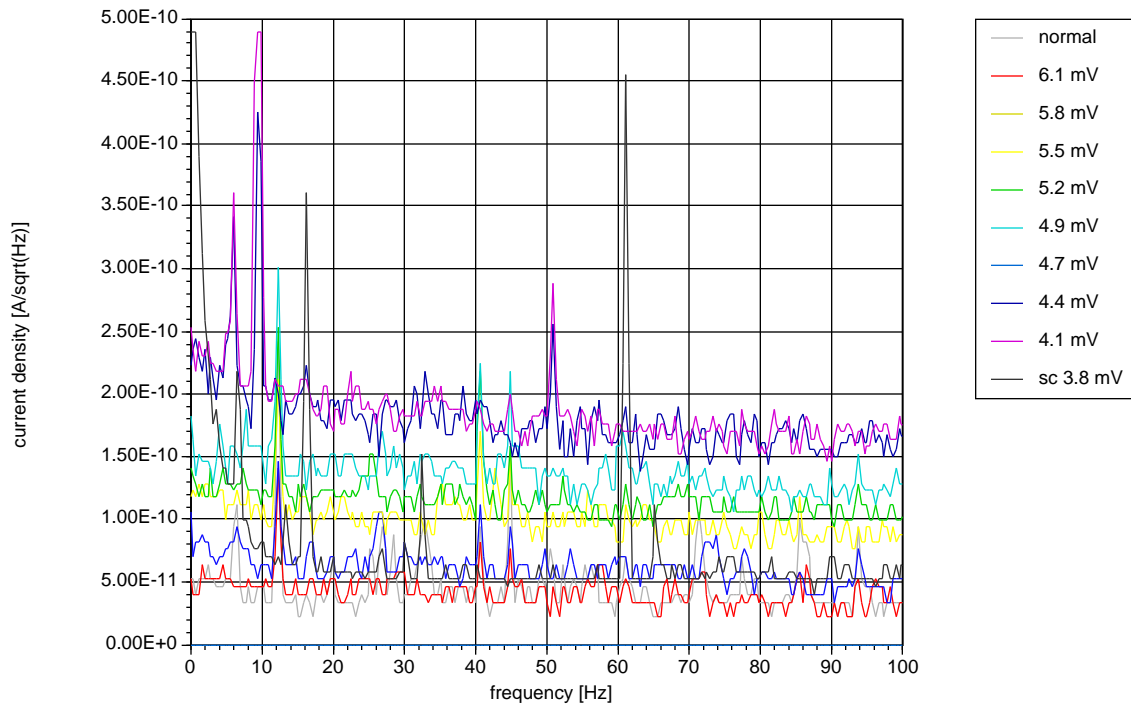


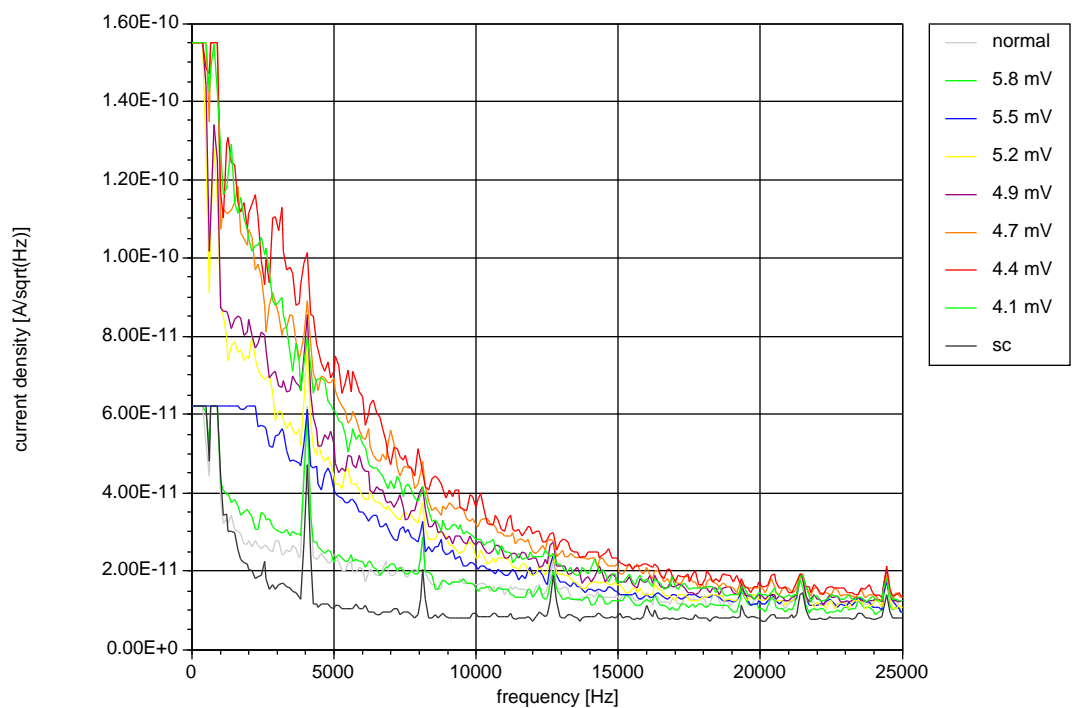
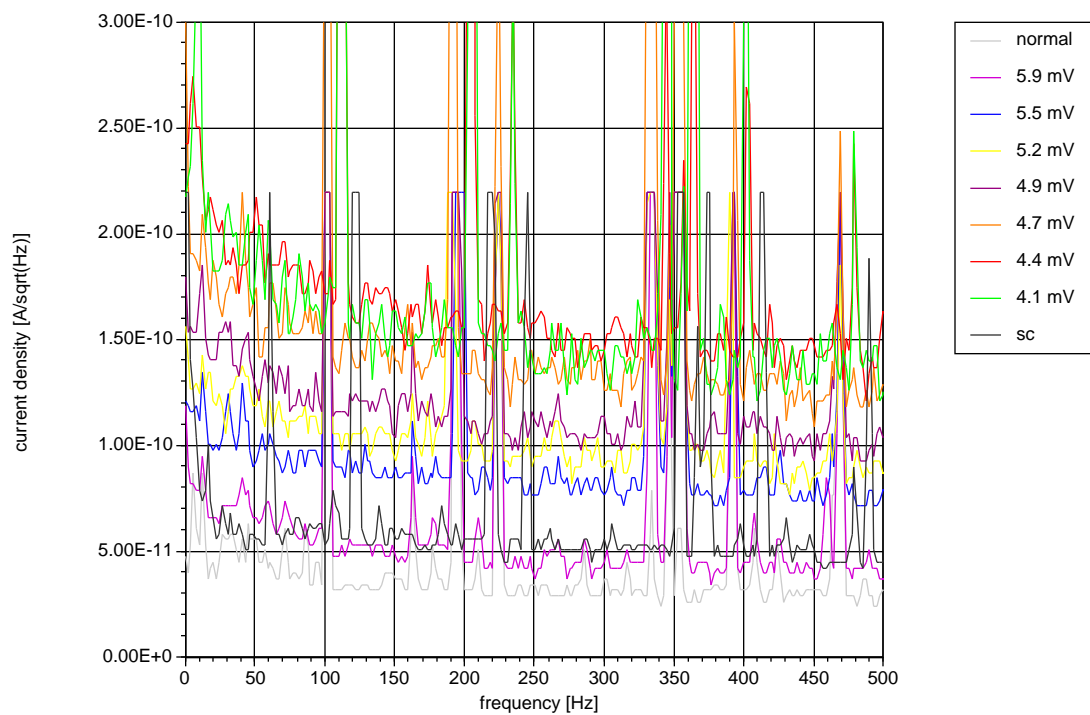
I-V curves MoAu devices, 500 seconds scan time (note current on y-axis goes up for lower counts)

Noise measurements:

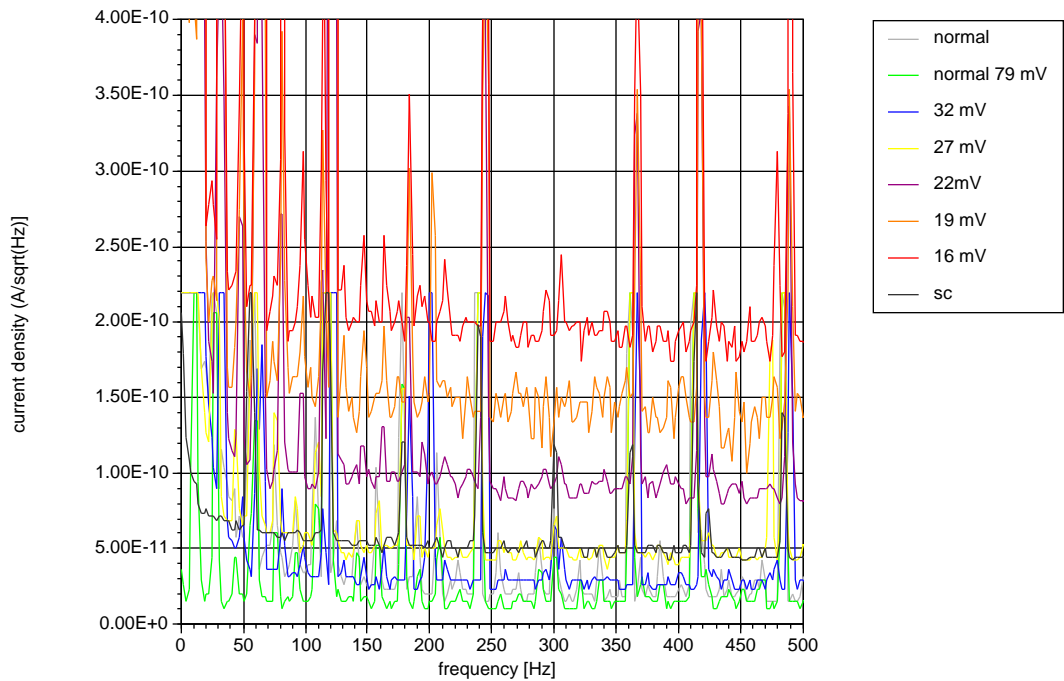
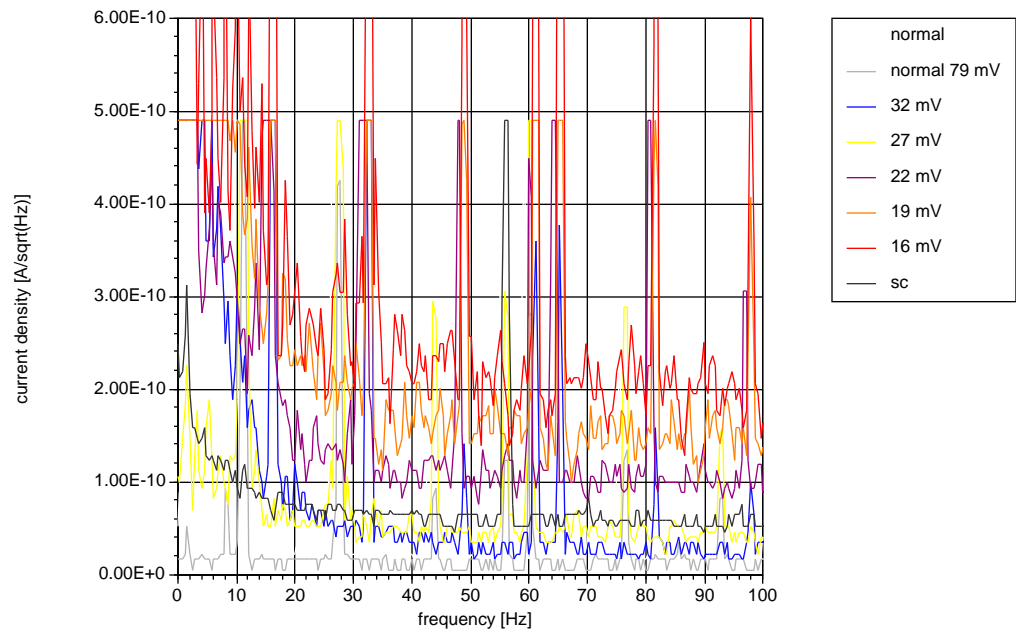
The following figures show noise measurements of the tested devices.

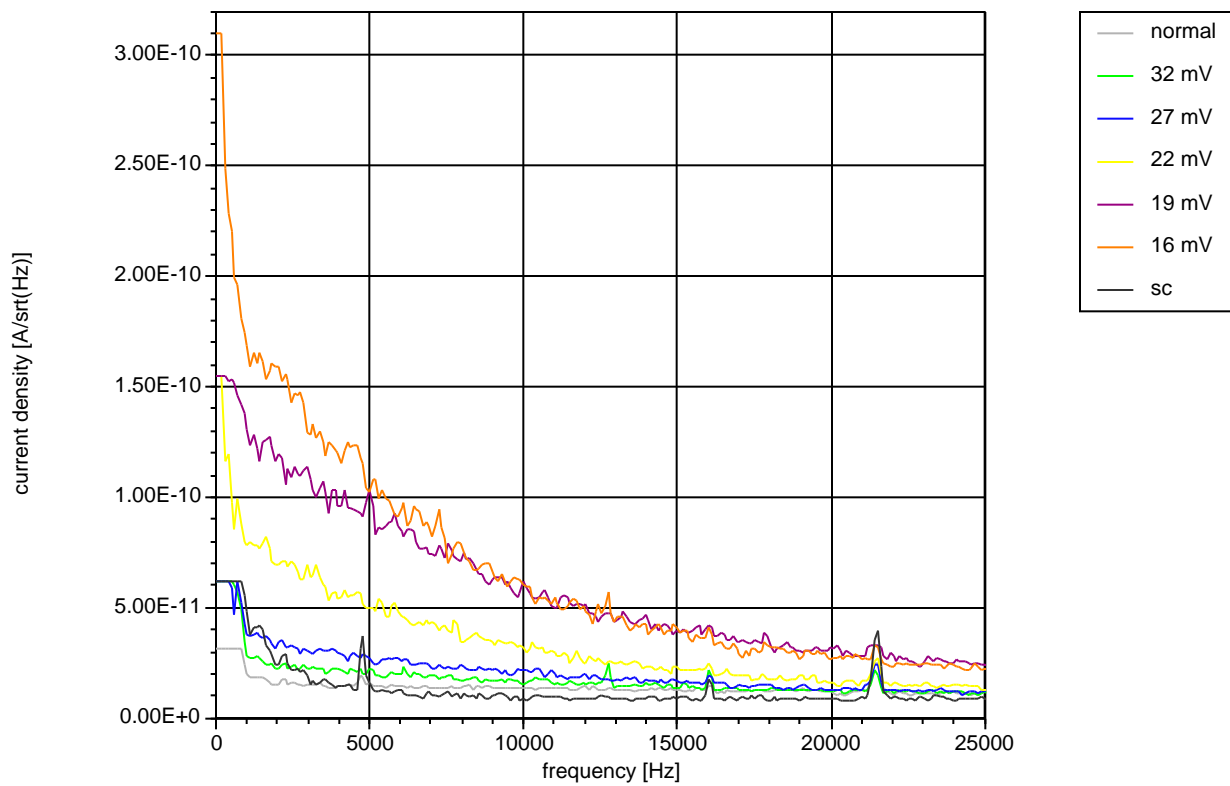
MoAu devices:



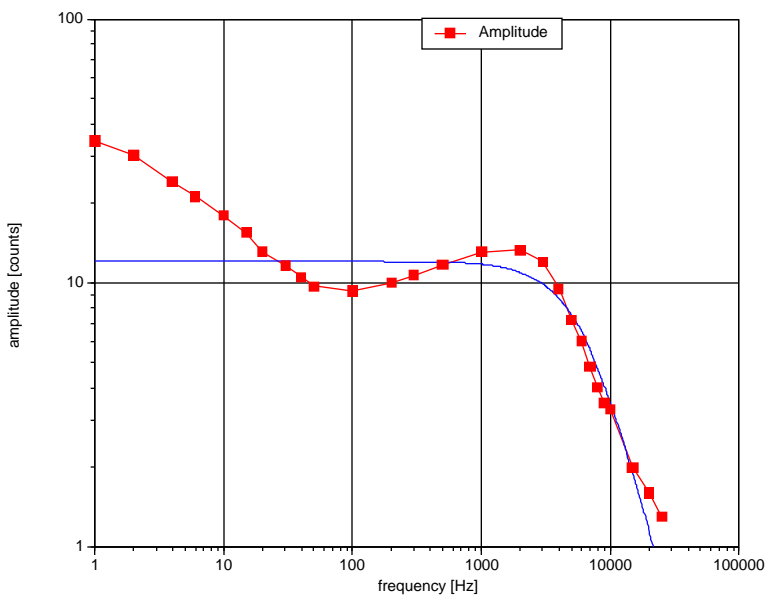


MoCu (NIST-)devices:



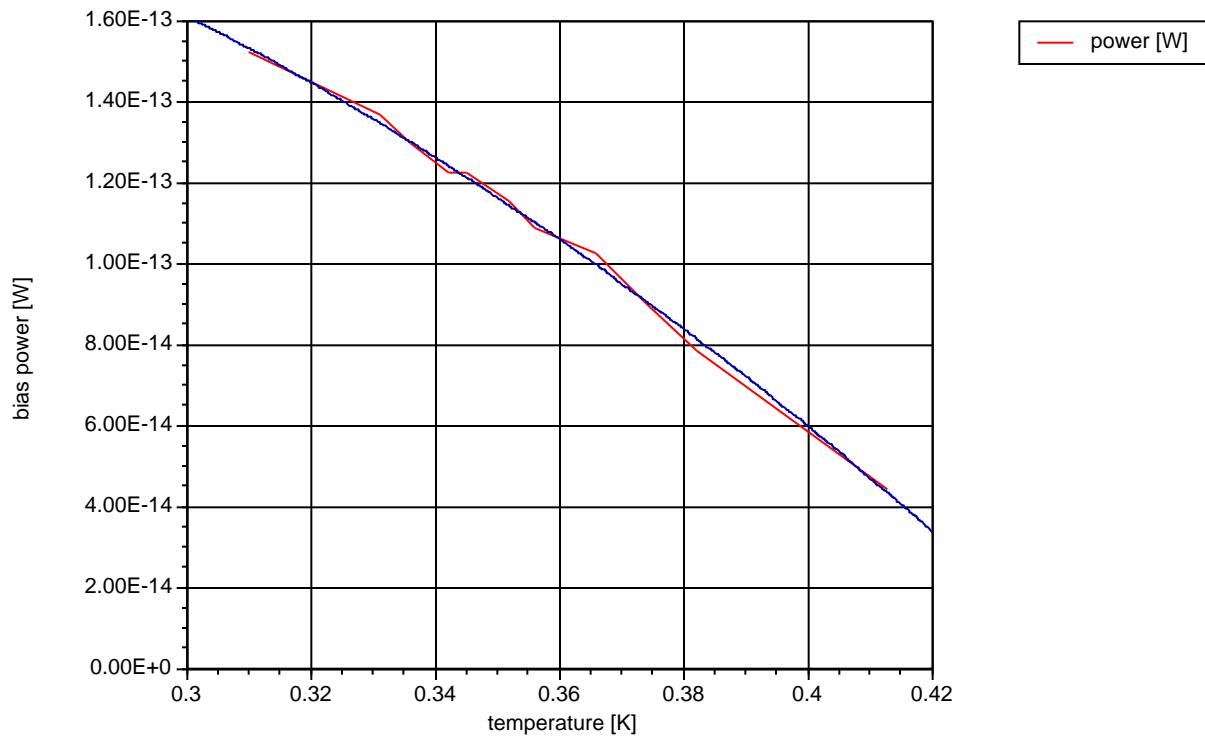


ETF time constant MoAu device



These measurements were made with small amplitude sine waves added to DC bias.

thermal conductivity MoAu device



The figure shows the dissipated Joule power in the devices vs. base temperature.
The red line represents the data, the blue line is the fit.

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A fit to the equation $P = G_0 (T_C^{n+1} - T_{\text{base}}^{n+1}) / (n+1)$
yields:

$$G_0 = 5.3 \cdot 10^{-10} \text{ W/K}^{n+1}$$

$$N = 1.6$$

$$T_C = 444 \text{ mK}$$